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- (54) **PROCESSING OF ENTERPRISE MESSAGES INTEGRATING VOICE MESSAGING AND DATA SYSTEMS**
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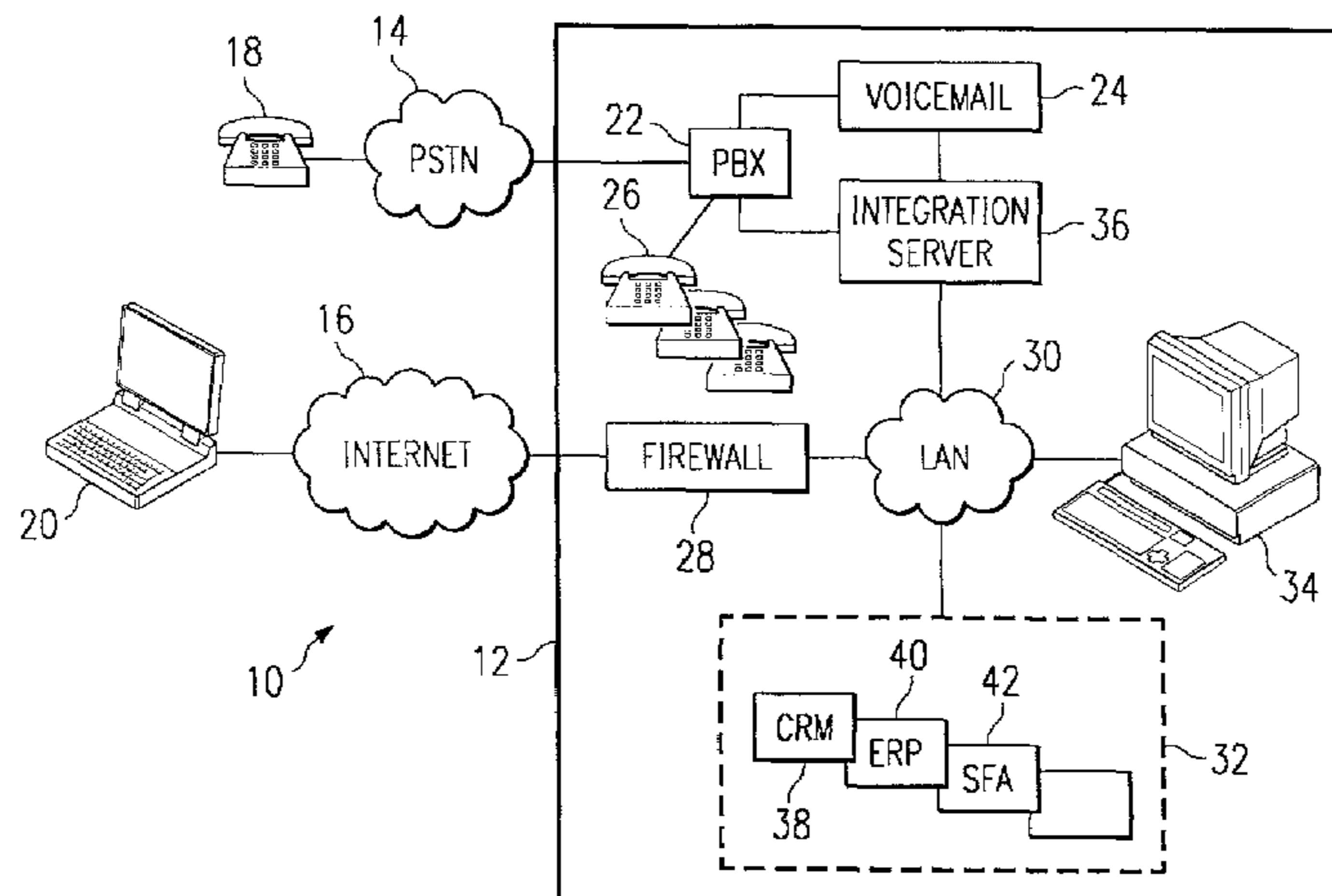
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(57) **ABSTRACT**

An enterprise system includes multiple disparate information systems, such as voice and data systems. An integration server provides for the interaction of information between these systems through the use of enterprise messages and processing rules. Enterprise messages allow for the association of information from disparate information systems, while the processing rules allow for automated interaction between users and information in the disparate information systems.

21 Claims, 4 Drawing Sheets

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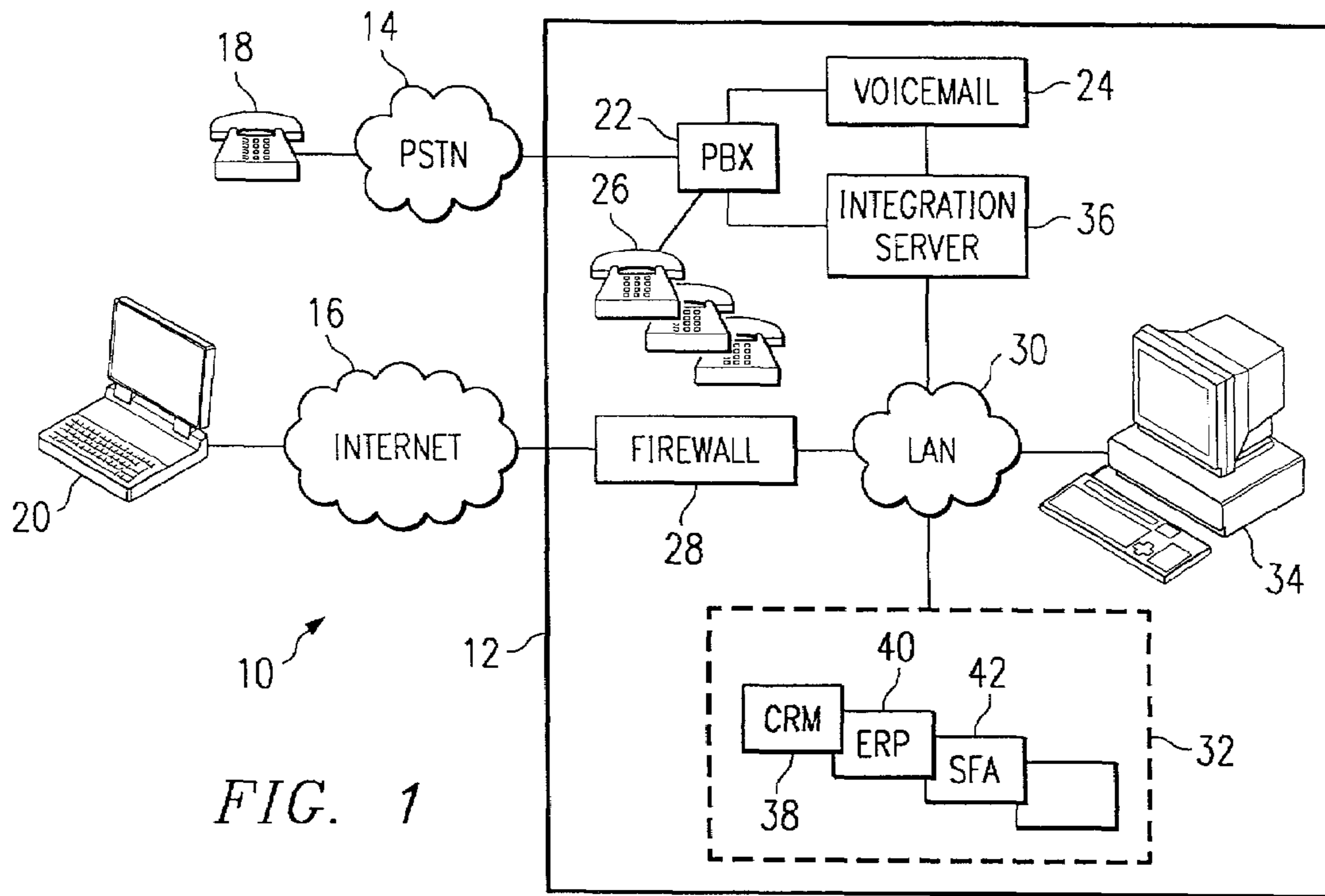


FIG. 1

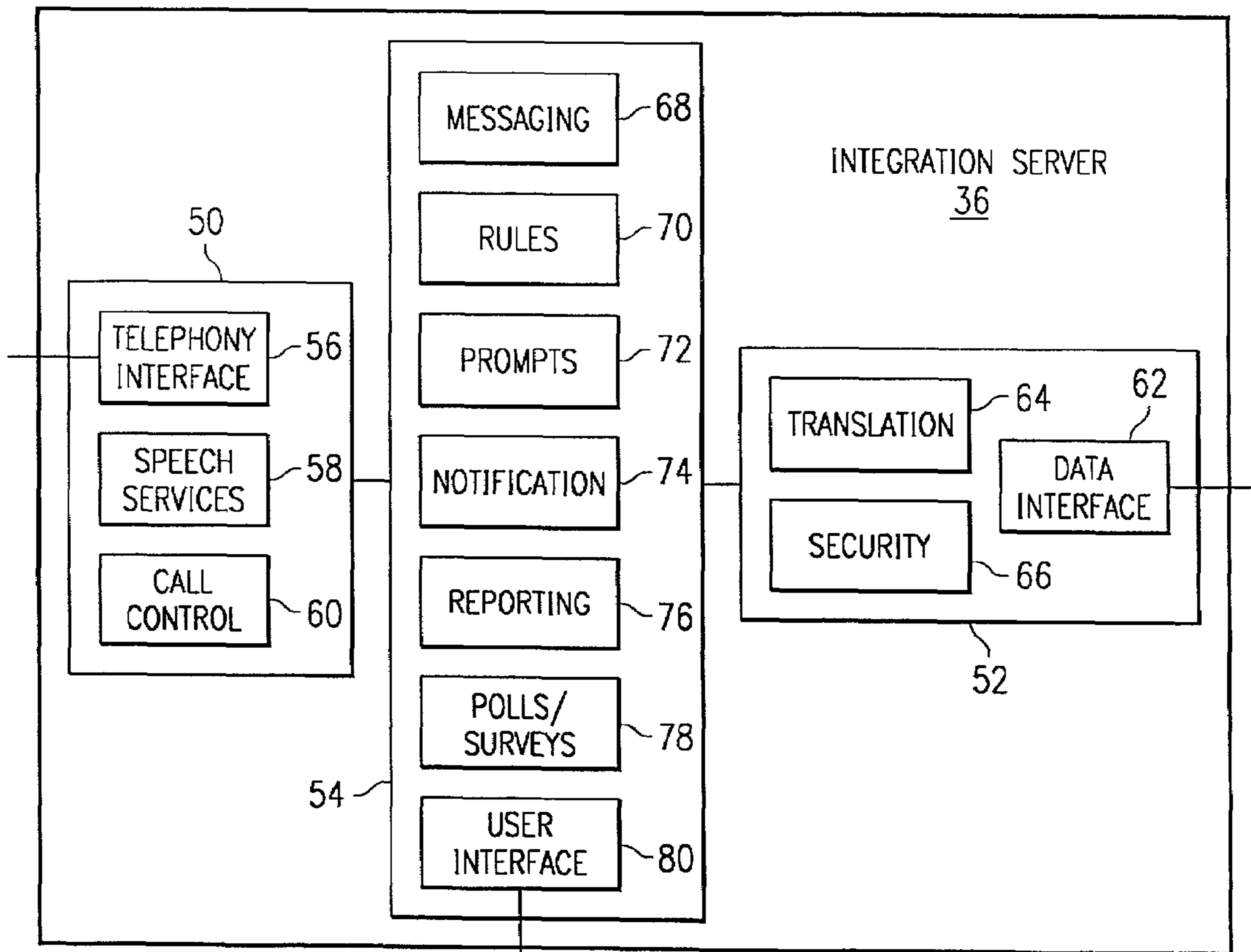
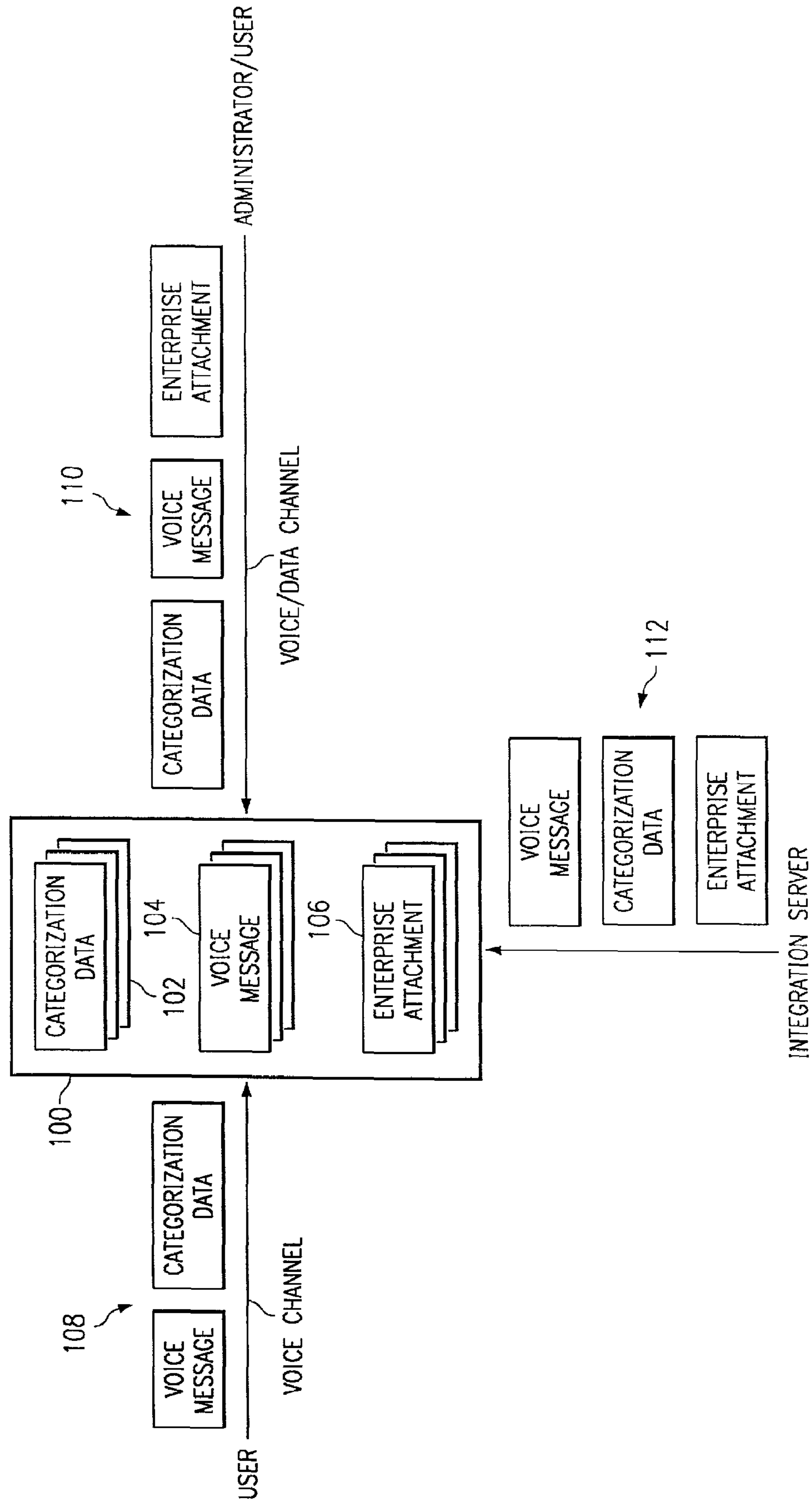


FIG. 2

FIG. 3



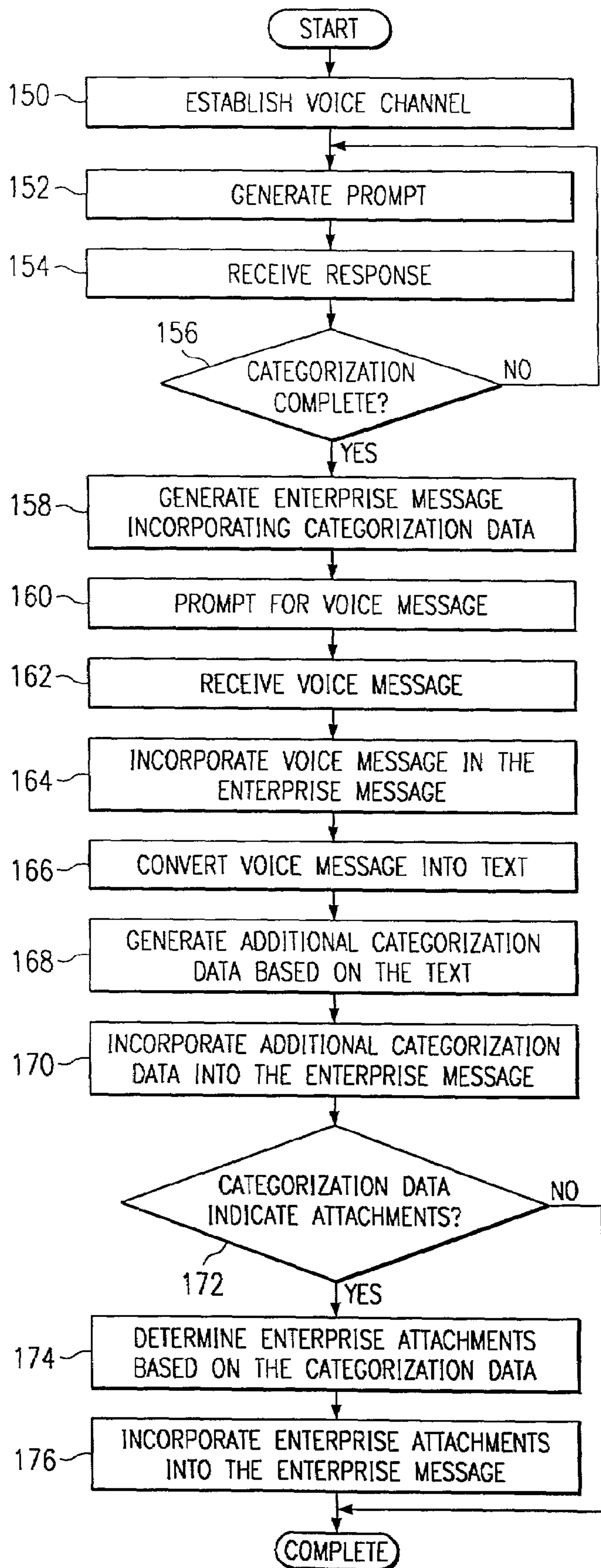


FIG. 4

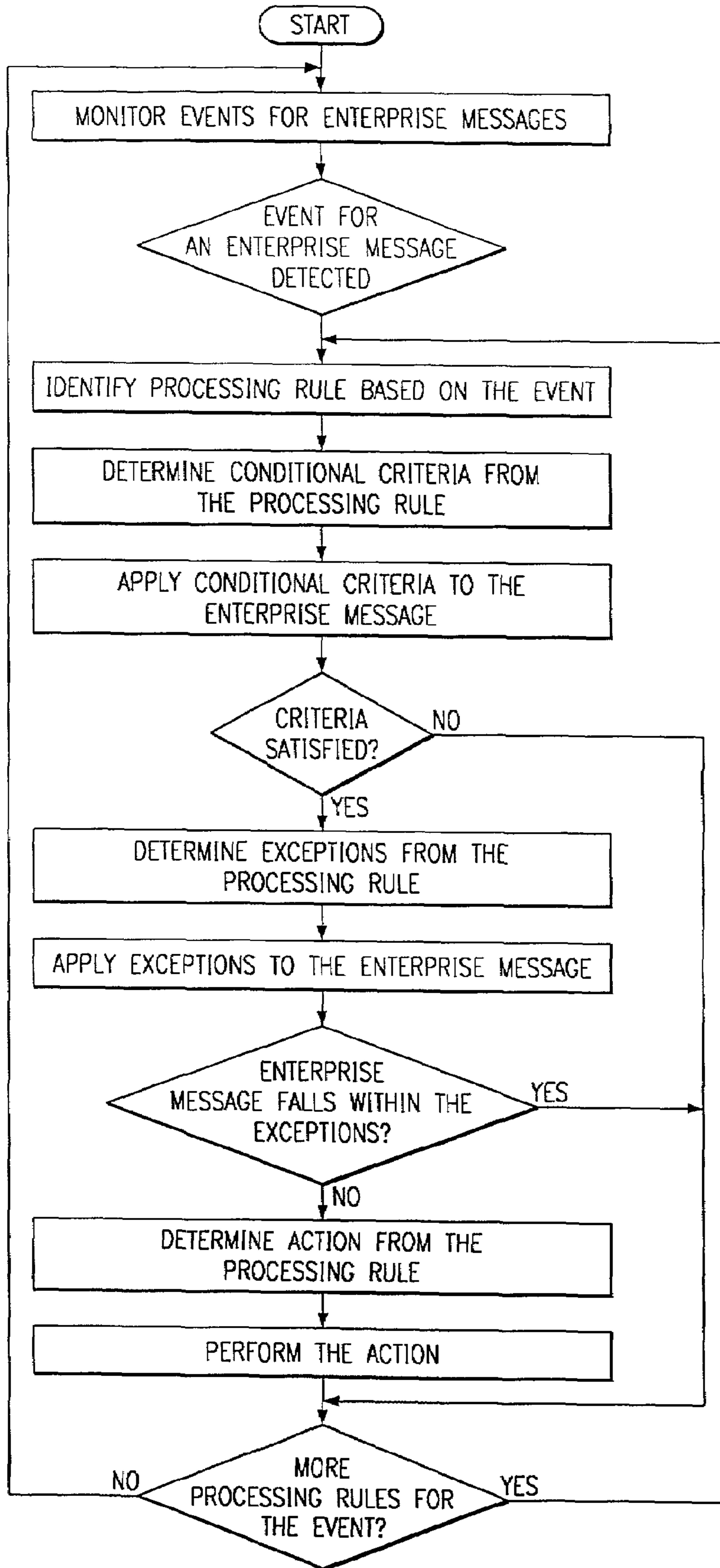


FIG. 5

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**PROCESSING OF ENTERPRISE MESSAGES
INTEGRATING VOICE MESSAGING AND
DATA SYSTEMS**

TECHNICAL FIELD OF THE INVENTION

The present invention relates generally to voice messaging systems and, more particularly, to integration of voice messaging and data systems.

BACKGROUND OF THE INVENTION

In many organizations, voicemail systems are an integral part of internal and external communications. These voicemail systems support interaction and information exchange between members of the organization and other individuals by providing a variety of features for messaging one or more people. However, voicemail systems are limited in their ability to perform complex messaging tasks to support effective information exchange.

SUMMARY OF THE INVENTION

In accordance with the present invention, techniques for the integration of messaging and data systems are provided which substantially eliminate or reduce disadvantages and problems associated with previous techniques. In a particular embodiment, the present invention satisfies a need for the integration of voice messaging systems and enterprise data systems within an organization.

Embodiments of the invention provide various technical advantages. These techniques provide for information maintenance and exchange by integrating voice messaging with enterprise data systems. Particular embodiments provide for the association of information, such as voicemail messages with data files, to provide coordination among various information systems. For example, a presentation on effective sales techniques for targeting large organizations may be attached to a voicemail message requesting help in targeting sales to IBM.

These techniques also provide for processing of associated information to support the effective exchange of information and automated maintenance and manipulation of enterprise data systems. For example, a voicemail message indicating a high probability of closing a large sale may result in the automated updating of enterprise resource planning systems, resulting in increased orders for parts necessary to fulfill the potential sale.

Other technical advantages of the present invention will be readily apparent to one skilled in the art from the following figures, descriptions, and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some, or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and its advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates a system having an enterprise information system including an integration server for integrating voice messaging systems with enterprise data systems;

FIG. 2 is a block diagram illustrating functional modules of the integration server;

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FIG. 3 is a block diagram illustrating exemplary information types maintained in an enterprise message and various methods for associating information within the enterprise message;

FIG. 4 is a flowchart illustrating a method for generating an enterprise message that includes various associated information; and

FIG. 5 is a flowchart illustrating a method for processing enterprise messages.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a system, indicated generally at 10, that includes an enterprise system 12 coupled via networks, such as a public switched telephone network (PSTN) 14 and the Internet 16, to external devices, such as external voice interface 18 and external data interface 20. Enterprise system 12 includes voice communication components, such as a voice switch 22, a voicemail system 24, and internal voice interfaces 26. Enterprise system 12 also includes data communication components, such as a firewall 28, a local area network (LAN) 30, enterprise data systems 32, and internal data interfaces 34. In addition, enterprise system 12 includes an integration server 36. In general, server 36 integrates information and features of both voice components and data components of system 12.

Enterprise system 12 represents any suitable collection of components from one or more organizations providing for maintenance of information and for the exchange of voice and data information among various system users. In the example illustrated, these components include voice interaction components and data interaction components as well as server 36, which provides for integration of information from the voice and data components. The voice components of enterprise system 12 provide connectivity for voice communications and other functions related to voice communications, such as the maintenance of stored voice messages. Voice switch 22 provides a link to outside voice communication networks, such as PSTN 14, and provides voice communication channels for users of enterprise system 12. For example, voice switch 22 supports voice communication channels between external voice interfaces 18 and components within enterprise system 12, such as voicemail 24, internal voice interfaces 26, and server 36. However, while this example illustrates voice switch 22 as a private branch exchange (PBX), system 10 contemplates enterprise system 12 implementing voice switch 22 using any suitable technology. Thus, voice switch 22 may include any hardware and associated logic supporting voice communications, such as circuit switched and/or packet-based communication equipment.

Voicemail 24 provides voicemail features and functionality for users of enterprise system 12. For example, voicemail 24 may include voice mailboxes for any number of users associated with enterprise system 12. Using voice interfaces 18 or 26, users may access voicemail 24 through voice switch 22 to access mailboxes, leave messages, and perform other appropriate voicemail tasks.

Within enterprise system 12, data processing elements provide for storage, access, maintenance, and manipulation of data. Firewall 28 provides connectivity between elements of enterprise system 12 and external devices by linking to external networks, such as the Internet 16 or other suitable data networks. LAN 30 provides for the transport of information between various components of enterprise system 12 and provides data interfaces 20 and 34 access to each other and to server 36 and enterprise data systems 32. Thus, LAN 30 may include any suitable collection and arrangement of commu-

nications elements. Moreover, while labeled as a local area network, system 10 contemplates LAN 30 encompassing any suitable networks for linking elements within enterprise system 12.

Enterprise data systems 32 represent applications and equipment for maintaining organizational information for enterprise system 12. In the example illustrated, enterprise data systems 32 include a customer relationship management (CRM) application 38, an enterprise resource planning (ERP) application 40 and a sales force automation (SFA) application 42. CRM 38 maintains information on customers associated with enterprise system 12, such as customer account information. ERP 40 maintains information relating to the operation and management of various tasks associated with enterprise system 12. This may include information and/or forecasts that support the procurement of parts and equipment necessary for fulfilling orders and/or potential orders from customers of enterprise system 12. SFA 42 includes information describing the sales force associated with enterprise system 12, such as data on the sales and activities of particular sales representatives associated with enterprise system 12. In addition, while the particular examples illustrated provide specific instances of data maintained by enterprise system 12, enterprise data systems 32 may include any suitable information for the organization associated with enterprise system 12, with stored information maintained using any appropriate data storage technology.

Within enterprise system 12, server 36 provides for the interaction and integration of information between voice components and data components. Server 36 represents any suitable combination and arrangement of hardware and associated logic for interfacing with users and processing data and voice information. In operation, server 36 develops and processes constructs, referred to as enterprise messages, that include various combinations of voice messages, enterprise data, and categorization data related to the enterprise message. Through interaction with system users various system elements, server 36 handles the creation and processing of enterprise messages.

To create an enterprise message, server 36 initially interacts with a user over a voice channel. For example, server 36 may establish a voice channel through voice switch 22 to voice interface 18 or 26. Similarly, server 36 may establish a voice channel through a data network, such as a voice channel through LAN 30 to data interface 20 or 34. Using the voice channel, server 36 elicits a voicemail message from the user. In addition, server 36 also develops categorization data based on information received from the user. According to particular embodiments, server 36 generates one or more voice prompts to elicit categorization data from the user. For example, using a voice response unit (VRU), server 36 may request information from the user for categorizing an enterprise message that includes the voicemail message. This may include information such as account names, customer names, message summaries, voicemail descriptions, and/or any other suitable information for categorizing the enterprise message. In addition to using prompts to elicit categorization data from a user, server 36 may also (or alternatively) use speech to text technology to extract categorization data from the voicemail message received from the user. The categorization data permits server 36 to link a resulting enterprise message to one or more enterprise data systems 32. For example, upon determining that a voicemail message includes a sales update, server 36 may determine the appropriate customer account from CRM 38 to which the update applies.

This voicemail message and the associated categorization data form the basis of an enterprise message. To store these

enterprise messages, server 36 may have access to internal and/or external memory devices. Moreover, server 36 may store enterprise messages and/or portions of enterprise messages in one or more locations. For example, server 36 may store voicemail messages in voicemail 24 while internally maintaining enterprise messages with categorization data and pointers to particular voicemail messages.

In addition to handling enterprise message creation, server 36 also processes enterprise messages based upon automated rules and/or interactions with system users. According to particular embodiments, server 36 processes enterprise messages based upon a set of processing rules. These rules set forth actions for server 36 to take given the occurrence of particular events. According to a particular embodiment, each rule specifies an event and an action and may also specify conditional statements as well as exceptions to the rule. For example, a particular rule may state that upon message creation, if the enterprise message relates to a specific account name, then server 36 should generate a notification to a particular address, except when the priority of the enterprise message is low. Thus, this example message includes an event (message creation), an action (notification), a conditional clause (if the message relates to an account), and an exception (for a low message priority). Events for rules may include occurrences such as message creation, message modification, expiration of time periods, or other suitable events. Conditional statements and/or exceptions qualify the occurrence of the event. Therefore, server 36 only performs an action specified by a rule given the occurrence of an event and the satisfaction of conditional statements and exceptions.

Each rule may specify one or more actions for server 36 to take. These actions include tasks such as message routing, notifications, message attachments, and data manipulation. Routing rules identify voice mailboxes, external systems, entities (such as a particular enterprise message account), or other appropriate targets for receiving copies of the enterprise message. Thus, when executing a rule specifying routing of an enterprise message, server 36 forwards some or all of the enterprise message to the target or targets specified by the rule. For example, for a routing rule targeting a voice mailbox, server 36 may forward only voicemail messages from the enterprise message to the indicated voice mailbox (and potentially an indication that additional information is available). A routing rule specifying an entity, such as a project manager for a customer account, will result in server 36 forwarding a copy of the entire enterprise message. In addition, when forwarding an enterprise message, server 36 may augment the categorization data of the enterprise message to indicate the particular routing rule resulting in the forwarded enterprise message.

Notification rules identify e-mail addresses, pager numbers, voice mailboxes, short message service addresses, telephone numbers, and/or other targets for receiving notification of the occurrence of an event associated with the enterprise message. For example, upon the creation of an enterprise message associated with a particular account and specifying a high probability for a large sale, a rule may specify particular addresses and phone numbers to be notified. In addition, notification rules may specify interactive functions to elicit additional information from one or more users. For example, an interactive notification rule may specify the telephone number for an administrator associated with an account specified in categorization data of an enterprise message. To execute the notification rule, server 36 establishes a voice channel with the administrator and, using VRU technology, elicits authorizations and/or other suitable responses from the administrator. Thus, these interactive notifications support

tasks such as authorizations of pending actions, updates to enterprise messages, clarifications of information in enterprise messages, modifications to enterprise messages, additions to enterprise messages, and other appropriate tasks.

Rules may also specify links to data files in enterprise data systems **32** for attachment to an enterprise message. For example, an enterprise message with categorization data specifying a request for help on particular sales techniques may trigger the attachment (or linking) of a PowerPoint presentation from an enterprise data system **32** that covers these techniques. Thus, an enterprise message may, in addition to categorization data and voice messages, include one or more data files. This permits the association of information from disparate systems, such as voicemail systems and data systems. By permitting these types of associations, system **10** supports the preservation of links between the associated information. For example, this permits the preservation of the context of a particular grouping of information within an enterprise message.

In addition to specifying message routing, notifications, and attachments, rules may also trigger modifications or updates to data in enterprise data systems **32**. For example, server **36** may use categorization data in an enterprise message related to a particular customer to update CRM **38** given the occurrence of a triggering event, such as the creation or modification of the enterprise message. Consider a voicemail message identifying a point of contact for a particular customer. Upon generating appropriate categorization data relating to the voicemail message, server **36** may, in response to a rule, identify the customer in CRM **38** and automatically update the point of contact information. Similarly, server **36** may use categorization data to update or modify other information in enterprise data systems **32** when appropriately triggered. This fosters tight integration between voice and data systems, permitting partial or full automation of various management tasks of enterprise system **12**. For example, upon receiving an appropriately authorized enterprise message indicating a sufficiently high opportunity win percentage for sales to a customer account, server **36** may update ERP **40** to schedule orders for parts necessary to fulfill the anticipated order. Likewise, a drop in an opportunity win percentage may trigger order reductions or cancellations.

In addition to actions taken automatically based on rules, server **36** also supports access by users to existing enterprise messages. For example, an administrator, using data interface **20** or **34** (or potentially through voice interface **18** or **26**), may access server **36** to browse and potentially initiate processing of enterprise messages. In this manner, the actions specified by rules may also be initiated by appropriate users. Thus, categorization data, in conjunction with various processing rules, allows sorting, linking, nesting, and other manipulations of voice messages and related data systems.

FIG. 2 is a block diagram illustrating exemplary functional modules of server **36** that include telephony services modules **50**, data services modules **52**, and telephony/data integration modules **54**. Telephony services modules **50** include a telephony interface **56**, speech services module **58**, and a call control module **60**. Data services modules **52** include a data interface **62**, a translation module **64**, and a security module **66**. Integration modules **54** include a messaging module **68**, a rules module **70**, a prompts module **72**, a notification services module **74**, a reporting module **76**, a polls/surveys module **78**, and a user interface **80**. In general, server **36** provides voice services, such as voicemail messaging, using telephony modules **50** and provides data services, such as access to enterprise data systems **32**, using data modules **52**. In addition,

server **36** provides for integration of voice and data services and access to enterprise messages using integration modules **54**.

Telephony services modules **50** represent hardware and associated logic for interfacing with users over voice communication channels. Telephony interface **56** couples server **36** to various communication networks using one or more physical and/or virtual ports. For example, telephony interface **56** may include ports for PSTN **14**, LAN **30**, and the Internet **16**. Thus, telephony interface **56** supports various circuit-switched and packet-based communications protocols as appropriate for establishing voice communication channels. Speech services module **58** provides for processing of voice communication sessions, including interactive services. For example, speech services module **58** may provide dual-tone multi-frequency (DTMF) signal interpretation, automatic speech recognition (ASR) services, speech-to-text capabilities, and other appropriate speech related services.

Call control module **60** manages voice communications with users by controlling telephony services modules **50** and accessing integration modules **54** for information used during voice communication sessions. For example, call control module **60**, using telephony interface **56**, manages the establishment of voice communication sessions with users. Moreover, call control module **60** also manages processing for ongoing sessions. For example, call control module **60** may access information from prompts module **72** and use this information to generate prompts eliciting categorization data for use in generating an enterprise message. Thus, telephony services modules **50** support the establishment of voice communications to elicit voicemail messages and categorization data from users. Telephony services modules **50** may then pass this information on to integration modules **54** for the creation and/or modification of enterprise messages.

Data services modules **52** represent hardware and associated logic for coupling to data networks and interfacing with enterprise data systems **32**. Thus, data interface **62** links to one or more data networks, such as LAN **30**, to access enterprise data systems **32**, such as CRM **38**, ERP **40**, and SFA **42**. Translation module **64** manipulates data passing between integration modules **54** and outside data storage systems, such as enterprise data systems **32**. For example, enterprise data systems **32** may include one or more disparate data storage systems using various data storage techniques and protocols. Translation module **64** allows for the retrieval, manipulation, and storage of information into other data systems by translating between protocols used by integration modules **54** and protocols used by the other data systems.

Security module **66** limits access to enterprise data systems **32**, thus preventing unauthorized users from accessing and/or manipulating information stored in these systems. According to particular embodiments, security module **66** maintains information tracking access levels of various users and uses this information to moderate access to enterprise data systems **32**. In short, data services modules **52** provide monitored access to enterprise data systems **32** to retrieve, manipulate, and store digital data files from these systems, potentially for incorporation within enterprise messages.

Integration modules **54** provide services for integrating voice and data services within enterprise system **12**. Integration modules **54** provide for the creation and processing of enterprise messages and for the processing of information in enterprise data systems **32** based on these enterprise messages. In the particular embodiment illustrated, integration modules **54** include messaging module **68**, rules module **70**, prompts module **72**, notification module **74**, reporting module **76**, polls/surveys module **78**, and user interface **80**.

Messaging module **68** supports the creation and processing of enterprise messages based upon information received from voice services modules **50** and data services modules **52**. For example, messaging module **68** may receive a voice message and associated categorization data from telephony services modules **50** and generate and store an enterprise message incorporating the voice message and categorization data. In addition to message creation, messaging module **68** also processes enterprise messages based upon processing rules maintained by rules module **70**. Thus, messaging module **68** may access enterprise data systems **32** using data services modules **52** to manipulate information or to attach digital data files to enterprise messages. For example, upon identifying a data file for attachment to an enterprise message based upon a processing rule or in response to a request from a user, messaging module **68** may access data services modules **52** to request an address for the identified data file and may then store this address within the enterprise message, thus linking the enterprise message to the data file.

Integration modules **54** also include functional modules for storing and/or processing enterprise messages and for providing other voice and data services. Rules module **70** maintains various processing rules for use by messaging module **68** in processing enterprise messages. For example, rules module **70** may include various routing rules, notification rules, data manipulation rules, and other appropriate processing rules for manipulating and/or processing enterprise messages. Prompts module **72** includes information for use by voice services module **50** when interacting with users. For example, prompts module **72** may maintain various prompts for use in eliciting categorization data from users during a voice communication session. Prompts module **72** may maintain these prompts in a "script" that specifies appropriate prompts based on previous responses. To determine appropriate prompts, prompts module **72** may access information in enterprise data systems **32** using data services modules **52**. For example, to determine valid account names or customer names, prompts module **72** may access CRM **38**.

Notification module **74** contacts individuals and/or entities in response to appropriate commands received from messaging module **68** based on notification rules or in response to commands received from a user through user interface **80**. Reporting module **76** provides access to enterprise messages for various reporting functions. For example, a user may access integration modules **54** through user interface **80** and request access to enterprise messages of a particular type or containing specified categorization data. In response, reporting module **76** identifies appropriate enterprise messages and presents these messages to the user.

User interface **80** represents hardware and associated logic for interfacing integration modules **54** with various system users. Through user interface **80**, users, such as system administrators, access integration modules **54** to view and manipulate enterprise messages. For example, an administrator may access integration modules **54** to attach data files from enterprise data systems **32** to enterprise messages, to attach voicemails to enterprise messages, to authorize various actions requiring approval, to configure processing rules and/or prompts, or to perform other suitable administrative tasks.

While the particular embodiment illustrated and the preceding description focus on a particular combination and arrangement of functional elements within server **36**, system **10** contemplates server **36** including any appropriate combination and arrangement of elements for integrating voice and data services. Thus, specific elements illustrated and functionalities described may be separated, combined, rearranged, or otherwise modified, and any of these functional-

ities may be implemented using logic encoded in media. Furthermore, the embodiment illustrated separates modules primarily by functionality, and server **36** including and/or accessing any suitable equipment for performing each of these tasks. For example, server **36** may be a computer having one or more processors for executing various logic routines implementing some or all of the functionalities described above. In addition, while the embodiment illustrated includes various interfaces for voice, data, and user access, server **36** may include any suitable hardware and logic for linking to various communication systems and users. Moreover, server **36** may link to these systems using any number and type of links and communications protocols. For example, while the embodiment illustrated presents user interface **80** as a separate module, server **36** may interface with users, such as administrators, using telephony interface **56** and/or data interface **62**. Thus the example provided by this embodiment is merely illustrative, and system **10** contemplates server **36** using any suitable hardware and/or logic for integrating voice and data systems.

FIG. **3** is a diagram illustrating an exemplary data structure for an enterprise message **100** and potential sources of information in enterprise message **100**. In the example illustrated, enterprise message **100** includes categorization data **102**, voice messages **104**, and enterprise attachments **106**. In general, enterprise message **100** provides for the association of information from disparate information systems, such as voice and data systems.

As previously discussed, categorization data **102** includes any suitable information for describing enterprise message **100**. For example, categorization data **102** may include time stamps, user identifiers, message priorities, information obtained from voice recognition, keywords obtained using speech to text technology, customer names, account names, message types (such as sales pipeline updates, sales questions or answers, or message replies), and any other suitable information for describing enterprise message **100** or detailing the association of enterprise message **100** with voice and/or data systems.

Enterprise message **100** also includes one or more voice messages **104**. Voice messages **104** include voice recordings from one or more users recorded at any number of different times. For example, voice messages **104** may include messages and replies constituting a thread of voicemail messages. However, voice messages **104** in enterprise message **100** may be grouped according to any suitable criteria. For example, enterprise message **100** may include voice messages **104** based upon processing rules and/or instructions received from various users. Moreover, while the embodiment illustrates enterprise message **100** incorporating voice messages **104**, system **10** contemplates enterprise message **100** maintaining any suitable information for accessing various voicemail messages. For example, enterprise message **100** may include one or more addressing links for accessing messages maintained in voicemail **24**.

In addition to voice messages **104**, enterprise message **100** also may include one or more enterprise attachments **106**. Enterprise attachments **106** represent any suitable digital data files. Thus, enterprise attachments **106** may include application data files, such as Word documents, PowerPoint presentations, spreadsheets, and other suitable files. Moreover, enterprise attachments **106** may include executable files, customized data representations, and any other suitable information for association with voice messages **104** and categorization data **102**. As with the storage of voicemail messages, enterprise message **100** may store some or all of enterprise

attachments **106** as addressing links, such as links to information stored in various enterprise data systems **32**.

As illustrated in this embodiment, enterprise message **100** may receive categorization data **102**, voice messages **104**, and enterprise attachments **106** through one or more methods. Through a voice channel, users access server **36** and supply voice messages and categorization data for inclusion within enterprise message **100**, as indicated at **108**. Through voice/data channels, users, such as an administrator, supply categorization data, voice messages, and/or enterprise attachments for inclusion within enterprise message **100**, as indicated at **110**. In addition, server **36** may automatically introduce categorization data, voice messages, and/or enterprise attachments into enterprise message **100**, as indicated at **112**, in response to various processing rules. Thus, enterprise message **100** may include categorization data **102**, voice messages **104**, and enterprise attachments **106** received from one or more sources at any suitable times.

For example, consider a sales representative contacting server **36** with a sales question regarding sales to large customers. Through a voice channel established with server **36**, the sales representative supplies information for categorizing the sales question, such as the customer's name and information identifying the message as a sales question. Server **36** may elicit this information, for example, through a series of prompts requesting voice responses, dual-tone multi-frequency signals, and/or other suitable indications. In addition to providing the categorization data, the sales representative records a voice message, and server **36** generates an enterprise message containing the categorization data and voice message received from the sales representative. Depending on current processing rules in place, server **36** may automatically contact another system user, such as a manager for the sales representative, in order to provide a quick response to the sales question.

An administrator accesses server **36**, potentially in response to a notification, and accesses the enterprise message containing the sales question from the representative. In response to the question, the administrator can attach voice messages, enterprise attachments, links to other enterprise messages, and may add further categorization data. For example, in response to the sales question, the administrator may attach a sample presentation suitable for sales to large clients. The administrator may then refer the enterprise message back to the sales representative that originated the question. In addition, the administrator may also use the resulting enterprise message for other tasks. For example, the administrator may generate a processing rule that links future questions with similar categorization data to this enterprise message, such that server **36** may automatically respond to similar questions.

Now consider that, in response to the answer from the manager, the sales representative successfully pitches the large client and contacts server **36** to generate an enterprise message reflecting the imminent success. During this session with server **36**, the sales representative may generate a new enterprise message or simply augment the existing enterprise message by supplying new categorization data and a voice message. For example, the sales representative may supply categorization data indicating an increased opportunity win percentage and the scope of the potential sale. Based upon this opportunity win percentage, server **36** may identify processing rules that identify updates in one or more enterprise data systems **32**.

For example, as previously discussed, upon identifying an opportunity win percentage that exceeds some threshold, server **36** may update ERP system **40** to reflect additional

orders for components needed to fulfill the expected sale. However, before this data manipulation may occur, a processing rule may indicate that management approval is required. For example, a processing rule may instruct server **36** to notify a particular manager using an interactive session, during which server **36** presents information, such as the identity of the sales representative, the indicated opportunity win percentage, and other appropriate data, and requests approval from the manager. In response to receiving an approval, server **36** accesses the appropriate enterprise data systems **32** to manipulate data in response to the expected sales.

Therefore, as illustrated by this example, server **36** provides for a tight integration of voice and data systems and for the association of information for use in a variety of enterprise activities. For instance, while the preceding example describing a sales question and answer and a resulting sale illustrates the power of these techniques in coordinating communications, this association of information can provide valuable information for future transactions. Thus, server **36** may maintain this association of information as part of an enterprise knowledge base for any number of uses. For example, the manager may identify the sales question and answer and the resulting success in a sale as an appropriate training tool and forward the enterprise message to a training department. Thus, as evidenced by this relatively simple example, server **36** may use enterprise messages to provide an integration of voice and data systems that preserves context and the relevancy of links between various disparate types of information.

FIG. **4** is a flowchart illustrating an exemplary method for generating and processing an enterprise message. Initially, server **36** establishes a voice channel with a user at step **150**. Using the voice channel, server **36** communicates a prompt for categorization data to the user and receives a response at steps **152** and **154**. Server **36** determines whether categorization is complete at step **156** and, if not, continues prompting the user for additional categorization data. For example, server **36** may generate a series of prompts to elicit categorization data for associating a voice message with data maintained in one or more of enterprise data systems **32**. Upon completing categorization of the communications, server **36** generates an enterprise message incorporating the categorization data at step **158**. In addition, server **36** prompts the user for a voice message and receives the voice message at steps **160** and **162**. Server **36** incorporates the voice message into the enterprise message with the categorization data at step **164**.

In addition to receiving categorization data from the user in response to various prompts, this example also illustrates server **36** generating categorization data based upon information in the voice message. Thus, server **36** converts the voice message into text at step **166** and generates additional categorization data based on the text at step **168**. For example, server **36** may match the text against keyword indexed populated with information from enterprise data systems **32**. Server **36** then incorporates this additional categorization data into the enterprise message at step **170**. Therefore, server **36** may obtain categorization data through questions, prompts, or other suitable requests for information from the user and/or may determine categorization data from information embedded within the voice message received from the user.

During generation of an enterprise message, server **36** may also use categorization data to determine appropriate enterprise attachments for inclusion within the enterprise message. Thus, server **36** determines whether the categorization data identify particular enterprise attachments at step **172**. For example, server **36** may access processing rules triggered by

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message creation to determine whether the categorization data for this enterprise message satisfy the conditional criteria and exceptions established for a processing rule. Thus, server 36 determines enterprise attachments based on the categorization data at step 174 and incorporates the enterprise attachments into the enterprise message at step 176. For example, server 36 may identify digital data files for incorporation within the enterprise message and store links to these digital data files in the enterprise message.

The preceding example illustrates a sample process for generating an enterprise message that may include categorization data, a voice message, and potentially one or more enterprise attachments. However, while this flowchart illustrates an exemplary method of operation, server 36 may use any suitable techniques for obtaining categorization data and voice messages from a user to generate an enterprise message. Therefore, many of the steps in this flowchart may take place simultaneously and/or in different orders than as shown. In addition, server 36 may use methods with additional steps, fewer steps, and/or different steps, so long as the methods remain appropriate.

FIG. 5 is a flowchart illustrating a method for server 36 to monitor and process enterprise messages. Server 36 monitors enterprise messages and determines whether an appropriate event for an enterprise message has been detected at steps 200 and 202. For example, server 36 may monitor for the creation of new enterprise messages, timeouts on existing enterprise messages, modifications to enterprise messages, and other suitable events affecting messages.

Upon detecting an appropriate event for an enterprise message, server 36 applies processing rules triggered by the event to the enterprise message. Thus, server 36 identifies a processing rule triggered by the event at step 204. Server 36 determines the conditional criteria for the processing rule at step 206 and applies the conditional criteria to the enterprise message at step 208. This determines whether the categorization data satisfy the conditional criteria for the processing rule. If the criteria are satisfied at step 210, server 36 determines exceptions specified by the processing rule at step 212 and applies the exceptions to the enterprise message at step 214. This determines whether the categorization data fall within an exception established for the processing rule. For example, a processing rule may have an exception that excludes processing of an enterprise message given certain categorization data, such as categorization data indicating a low message priority. If the enterprise message does not fall within the exceptions at step 216, server 36 determines the action specified by the processing rule at step 218 and performs the action at step 220. For example, as previously discussed, a processing rule may specify any suitable action, such as message routings, notifications, data attachments, data manipulations, and other appropriate voice and/or data integration services.

If the conditional criteria for the processing rule are not satisfied, if the enterprise message falls within the exceptions of the processing rule, or after performing the specified action, server 36 determines whether additional rules for the given event remain to be checked against the categorization data of the enterprise message at step 222. If not, server 36 returns to monitoring events for enterprise messages at step 200. If more processing rules for the given event remain, server 36 applies the conditional criteria and exceptions from these processing rules to the categorization data of the enterprise message as previously discussed. Thus, given the occurrence of an event associated with an enterprise message, server 36 may apply one or more processing rules resulting in manipulations of the enterprise message, manipulations of

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other enterprise messages, manipulations of data in external systems, such as enterprise data systems 32, contacts with other users, such as notifications to managers, and/or any other appropriate actions.

However, as with the flowchart detailing the operation of server 36 with respect to message generation, this flowchart illustrates only an exemplary method of operation, and server 36 may use any suitable techniques for processing enterprise messages using rules triggered by various events. Thus, many of the steps in this flowchart may take place simultaneously and/or in different orders than as shown. In addition, server 36 may use methods with additional steps, fewer steps, and/or different steps, so long as the methods remain appropriate. Therefore, the examples provided by these flowcharts are merely illustrative, and system 10 contemplates server 36 using any suitable steps for generating and processing enterprise messages to integrate information from disparate systems.

Although the present invention has been described in several embodiments, a myriad of changes and modifications may be suggested to one skilled in the art, and it is intended that the present invention encompass such changes and modifications as fall within the scope of the present appended claims.

What is claimed is:

1. A method for processing an enterprise message comprising:
 - maintaining a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;
 - detecting an occurring event for an enterprise message, the enterprise message comprising a voice message and categorization data, the categorization data elicited from a user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in a data system, the categorization data comprising at least one field corresponding to customer relationship management information maintained in the data system;
 - determining whether the occurring event matches the triggering event specified for a selected one of the rules;
 - if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and
 - if the categorization data satisfy the conditional criteria and no exception applies, performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data including at least enterprise resource planning information maintained in the data system.
2. The method of claim 1, wherein:
 - the field in the categorization data specifies a customer account identified in the customer relationship management information; and
 - the categorization data further comprises a sales opportunity update for the customer account.
3. The method of claim 2, wherein:
 - the categorization data satisfy the conditional criteria if the sales opportunity exceeds a threshold; and
 - the modifications to the enterprise resource planning information result in orders for a product associated with the sales opportunity update.

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4. The method of claim 3, wherein the orders are at least one of purchase orders for materials for producing the product and manufacturing requests for the product.

5. The method of claim 1, wherein the action further specifies routing of the voice message to a voice mailbox.

6. The method of claim 1, wherein the occurring event is a selected one of creation of the enterprise message and alteration of the enterprise message.

7. A method for processing an enterprise message comprising:

maintaining a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;

detecting an occurring event for an enterprise message, the enterprise message comprising a voice message and categorization data, the categorization data elicited from a user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in a data system;

determining whether the occurring event matches the triggering event specified for a selected one of the rules;

if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and

if the categorization data satisfy the conditional criteria and no exception applies, performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data;

the action further specifies an administrator for approving the modifications; and

performing the action specified for the selected rule comprises establishing a communication channel with the administrator, communicating a prompt on the communication channel, the prompt requesting approval of the modifications, receiving a response on the communication channel, and executing the modifications if the response indicates approval.

8. An integration server for integrating voice messaging and data systems, the server comprising:

a telephony services module operable to establish a voice channel with a user and to receive a voice message from the user;

a data services module operable to couple to a data system; and

an integration module operable to elicit categorization data from the user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in the data system, the categorization data comprising at least one field corresponding to customer relationship management information maintained in the data system the integration module further operable to:

store the voice message and the categorization data as an enterprise message;

maintain a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;

detect an occurring event for the enterprise message;

determine whether the occurring event matches the triggering event specified for a selected one of the rules;

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if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and

if the categorization data satisfy the conditional criteria and no exception applies, performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data including at least enterprise resource planning information maintained in the data system.

9. The server of claim 8, wherein:

the field in the categorization data specifies a customer account identified in the customer relationship management information; and

the categorization data further comprises a sales opportunity update for the customer account.

10. The server of claim 9, wherein:

the categorization data satisfy the conditional criteria if the sales opportunity exceeds a threshold; and

the modifications to the enterprise resource planning information result in orders for a product associated with the sales opportunity update.

11. The server of claim 10, wherein the orders are at least one of purchase orders for materials for producing the product and manufacturing requests for the product.

12. The server of claim 8, wherein the action further specifies routing of the voice message to a voice mailbox.

13. The server of claim 8, wherein the occurring event is a selected one of creation of the enterprise message and alteration of the enterprise message.

14. An integration server for integrating voice messaging and data systems the server comprising:

a telephony services module operable to establish a voice channel with a user and to receive a voice message from the user;

a data services module operable to couple to a data system; and

an integration module operable to elicit categorization data from the user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in the data system, the integration module further operable to: store the voice message and the categorization data as an enterprise message;

maintain a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;

detect an occurring event for the enterprise message; determine whether the occurring event matches the triggering event specified for a selected one of the rules;

if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and

if the categorization data satisfy the conditional criteria and no exception applies, performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data;

the action further specifies an administrator for approving the modifications; and

the integration module is further operable to perform the action specified for the selected rule by establishing a communication channel with the administrator, to com-

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communicate a prompt on the communication channel, the prompt requesting approval of the modifications, to receive a response on the communication channel, and to execute the modifications if the response indicates approval.

15. A computer program stored in a computer-readable medium and executable by a computer for processing an enterprise message by performing the following steps:

maintaining a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;

detecting an occurring event for an enterprise message, the enterprise message comprising a voice message and categorization data, the categorization data elicited from a user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in a data system, the categorization data comprising at least one field corresponding to customer relationship management information maintained in the data system;

determining whether the occurring event matches the triggering event specified for a selected one of the rules;

if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and

if the categorization data satisfy the conditional criteria and no exception applies, performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data including at least enterprise resource planning information maintained in the data system.

16. The computer program stored in a computer-readable medium of claim 15, wherein:

the field in the categorization data specifies a customer account identified in the customer relationship management information; and

the categorization data further comprises a sales opportunity update for the customer account.

17. The computer program stored in a computer-readable medium of claim 16, wherein:

the categorization data satisfy the conditional criteria if the sales opportunity exceeds a threshold; and

the modifications to the enterprise resource planning information result in orders for a product associated with the sales opportunity update.

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18. The computer program stored in a computer-readable medium of claim 17, wherein the orders are at least one of purchase orders for materials for producing the product and manufacturing requests for the product.

19. The computer program stored in a computer-readable medium of claim 15, wherein the action further specifies routing of the voice message to a voice mailbox.

20. The computer program stored in a computer-readable medium of claim 15, wherein the occurring event is a selected one of creation of the enterprise message and alteration of the enterprise message.

21. A computer program stored in a computer-readable medium and executable by a computer for processing an enterprise message by performing the following steps:

maintaining a plurality of rules, each rule specifying a triggering event, conditional criteria, zero or more exceptions, and an action;

detecting an occurring event for an enterprise message, the enterprise message comprising a voice message and categorization data, the categorization data elicited from a user during an interactive session in which the voice message is received from the user, the categorization data classifying the voice message according to its content and specifying at least one association between the voice message and information maintained in a data system;

determining whether the occurring event matches the triggering event specified for a selected one of the rules;

if the occurring event matches the triggering event for the selected rule, determining whether the categorization data for the enterprise message satisfy the conditional criteria specified by the selected rule; and

if the categorization data satisfy the conditional criteria and no exception applies performing the action specified for the selected rule, the action specifying modifications to information in the data system identified by the categorization data;

the action further specifies an administrator for approving the modifications; and

the method further includes performing the action specified for the selected rule by establishing a communication channel with the administrator, communicating a prompt on the communication channel, the prompt requesting approval of the modifications, receiving a response on the communication channel, and executing the modifications if the response indicates approval.

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